

WHAT IS CLAIMED IS:

1. A shaping optical system for a laser bar layered product for shaping a laser beam from a laser bar layered product in which a plurality of laser bars, 5 each of which is comprised of a plurality of semiconductor laser elements arrayed one-dimensionally, are layered along a direction which is perpendicular to both the array direction of said semiconductor laser elements and the laser beam traveling direction, comprising:

10 a refracting optical system,
a first laser beam group being at one side of
a boundary line,
15 a second laser beam group being at the other
side of the boundary line,
the boundary line being along said direction
of layering,
20 said second laser beam group being relatively
shifted together with respect to said first
laser beam group along the direction of said
layering; and
25 a transmission/reflecting optical system, which
transmits and reflects said first and second laser beam
groups so that said shifted first and second laser beam
groups align along said direction of layering.

2. The shaping optical system for a laser bar
layered product according to Claim 1, wherein said
refracting optical system is comprised of plane
parallel glass elements, of which a normal line exists
5 in a plane including a traveling direction of at least
one of said first and second laser beam groups and said
direction of layering, and forms a predetermined angle
with said traveling direction.

3. The shaping optical system for a laser bar
10 layered product according to Claim 1, wherein said
transmission/reflecting optical system further
comprises a first reflecting element which reflects one
of said first and second laser beam groups in a plane
including said array direction and said traveling
15 direction, and a second reflecting element to which the
laser beam group reflected by said first reflecting
element enters, wherein said second reflecting element
is comprised of a reflecting area for reflecting one of
said first and second laser beam groups and a
20 transmission area for transmitting the other, which are
alternately formed in stripes along said direction of
layering.

4. The shaping optical system for a laser bar
layered product according to Claim 3, wherein the
25 length along said array direction of said transmission
area is longer than the length along said array

direction of the laser beam group which transmits the transmission area.

5. The shaping optical system for a laser bar layered product according to Claim 2, wherein said plane parallel glass element further comprises a first plane parallel glass plate which is used with a light transmission space, and is set such that one of said first and second laser beam groups which has a shorter optical path up to the emission position of said 10 transmission/reflecting optical system transmits said first plane parallel glass plate, and the other which has a longer optical path transmits the light transmission space.

15. The shaping optical system for a laser bar layered product according to Claim 2, wherein said plane parallel glass element comprises a first plane parallel glass plate and a second plane parallel glass plate which is thicker than said first plane parallel glass plate, and is set such that one of said first and 20 second laser beam groups which has a shorter optical path up to the emission position of said transmission/reflecting optical system transmits said second plane parallel glass plate, and the other which has a longer optical path transmits the first plane 25 parallel glass plate.

7. The shaping optical system for a laser bar layered product according to Claim 6, wherein said first and second plane parallel glass plates are integrated.

5 8. The shaping optical system for a laser bar layered product according to Claim 1, wherein said refracting optical system is a prism which relatively shifts at least one of said first and second laser beam groups together, with respect to the other, only in
10 said direction of layering.

9. A laser light source comprising the shaping optical system for a laser bar layered product according to Claim 1, arranged on laser beam groups emitted from said laser bar layered product.

15 10. A laser light source comprising:
a laser-bar-stack emitting longitudinal laser beam patterns, the longitudinal laser beam patterns being aligned along the stack direction; and
means for distributing of the longitudinal laser beam patterns into a stepwise pattern; and
20 means for closing up each of the stepwise patterns along the longitudinal direction.

11. A shaping optical system for a laser bar layered product for shaping a laser beam from a laser bar layered product in which a plurality of laser bars,
25 each of which is comprised of a plurality of

5 semiconductor laser elements arrayed one-dimensionally, are layered along a direction which is perpendicular to both the array direction of said semiconductor laser elements and the laser beam traveling direction, comprising a optical member,

10 wherein a first laser beam group emitted from the laser bar layered product is at one side of a boundary line along said direction of layering, and a second laser beam group emitted from the laser bar layered product is on the other side of the boundary line,

15 wherein said optical member comprises a glass plate having parallel surfaces, one of said surfaces having stripe reflection films thereon, and the other of said surfaces having a partial reflection film thereon so that the second laser beam group travels along the layering direction relative to the first laser beam group, thereby first and second laser beam groups are emitted from the remaining region of the other surface.

20 12. A shaping optical system for a laser bar layered product for dividing and aligning laser beams from said product, said system comprising an optical member,

25 wherein said optical member comprises a glass plate having parallel surfaces, one of said surfaces having stripe reflection films thereon, and the other

of said surfaces having a partial reflection film thereon,

wherein $lx + my + nz = 0$ is the equation of said one of the surfaces, and $lx + my + nz = D$ is the equation of the other of said surfaces when x, y, z orthogonal coordinate system is applied, and wherein said optical member satisfies following expression:

$$Y_1 \geq Y = \frac{2nmD(\beta-1)}{(n+E)}$$

$$E = \sqrt{n^{*2} - 1 + n^2} - n$$

$$\gamma = \arccos \frac{-ml}{\sqrt{m^2 + n^2} \sqrt{l^2 + n^2}}$$

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where,

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Y_1 : the distance perpendicular to both of the longitudinal direction and the thickness direction of one reflection film of the stripe reflection films,

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γ : the angle between the longitudinal direction of one reflection film of the stripe reflection films and the boundary line between the partial reflection film and the remaining region,

D : the thickness of the glass plate,

n^* : the refractive index of the parallel glass plate,

β : the number of laser beams divided, the beam being emitted from one laser bar,

x : longitudinal direction of one of said laser bars,

5 y : layering direction of said laser bars, and

z : propagating direction of laser beam emitted from one of said the laser bars.

13. An optical member comprises a glass plate having parallel surfaces, one of said surfaces having 10 stripe reflection films thereon, and the other of said surfaces having a reflection film thereon,

15 wherein $lx + my + nz = 0$ is the equation of said one of the surfaces, and $lx + my + nz = D$ is the equation of the other of said surfaces when x , y , z orthogonal coordinate system is applied, and wherein said optical member satisfies following expression:

$$\beta = \frac{Y_1}{Y_2} + 1$$

$$Y_1 \geq Y = \frac{2nmD(\beta-1)}{(n+E)}$$

$$E = \sqrt{n^2 - 1 + n^2} - n$$

$$\gamma = \arccos \frac{-ml}{\sqrt{m^2 + n^2} \sqrt{l^2 + n^2}}$$

where,

Y1: the distance perpendicular to both of the longitudinal direction and the thickness direction of one reflection film of the stripe reflection films,
5

Y2: the distance between the films of the stripe reflection films.

γ : the angle between the longitudinal direction of one reflection film of the stripe reflection films and the boundary line between the reflection film and the remaining region,
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D: the thickness of the glass plate, and

n^* : the refractive index of the parallel glass plate.
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